the mannix story

June-July, 1972

Message from Management

G. J. POLLOCK
President,
Mannix Co. Ltd.

There are two sides to everything and to keep our story in perspective, we must be aware of the administrative side as well as the familiar and perhaps more exciting operational aspect. Each of these in turn have many facets which, for all their outward complexity must interlock to provide a smooth-running machine. Every cog in that machine, every individual, is essential. In this issue we have elements of both sides of the business.

At the Bighorn Storage and Power Development, material placement on a large scale, co-ordinated with a major electrical and water resource project, is rapidly moving toward an early completion. At the tar sands near Fort McMurray, long-term association and experience in a specialized overburden removal operation has enabled us to augment the owner's foresight in using every technical and engineering resource to solve production problems with increasing success.

The ongoing efforts and capabilities of our field people are in tangible view. End results and pride of workmanship are qualities that speak for themselves. Not so readily visible is the part played by support services like data processing.

Our Data Centre is one of the sophisticated tools of construction, serving the objectives of both administration and operations. Like many others who work quietly behind the scenes, the skills of our data processing people and their dedication to sound construction practice make them important allies to the men in the field. Instant communication, accurate reporting and storage of data on experience — past and present — are factors that involve both office and field personnel and contribute greatly to an integrated, efficient organization.

G. J. Pollock

the mannix story

Vol. 20 June-July, 1972 No. 4

in this issue

Bighorn Dam Progress

Mannix Data Centre

Overburden Removal near Ft. McMurray

Remember When?

"The Covers"

FRONT COVER

With supporting equipment, 150-ton end dump trucks and 15 cubic yard, electric drive front end loaders make fast work of overburden removal in the Athabasca Tar Sands.

BACK COVER

Sculpture assembled from computer components was one of a series assembled for Honeywell by Artists Jack Rindner and Ralph Moxcey. Used with an eye to serving human endeavor, similar parts are used in the kind of complex circuitry found in the Mannix Data Centre.

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. . . and myth gave way to machines

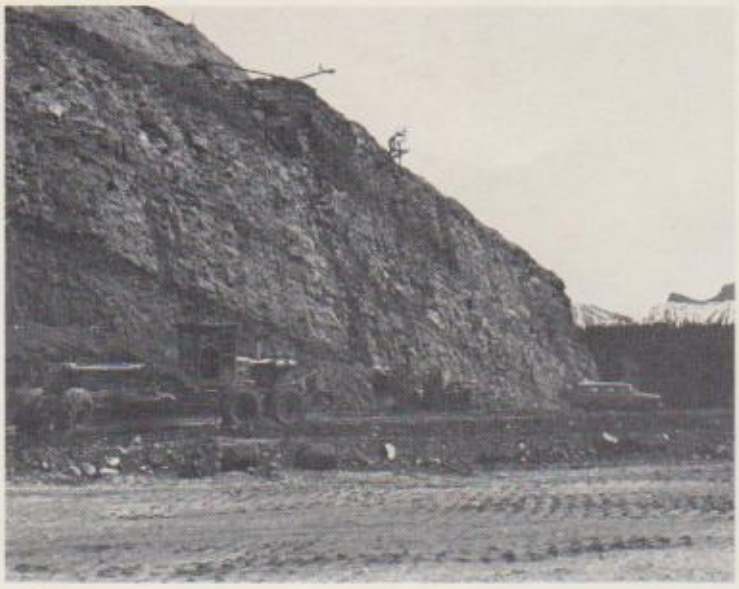
Along the high, time-worn banks of the North Saskatchewan River, 80 miles west of Rocky Mountain House, a legend gave way to the advance of heavy construction equipment. Our photo of a big, shy Sasquatch may well be the last time one will be seen on the heights overlooking the Bighorn Dam.

Since the early construction of 1969, men and machines have been creating a factual story for our time, bringing about a hydro development that was deemed impossible only 20 years ago. Unlike the Sasquatch, the Bighorn Power and Storage Development will be here for a long time to come.

Since Mannix Heavy Construction crews topped off the last 25 feet of the cut-off wall that extends to bedrock and seals the foundation against underground seepage, progress on the dam has been steady. Completed, the main dam will be over one-quarter of a mile in length, cresting at 300 feet above the riverbed.

The freeze-up of winter slows the work but not the progress. Last October, with 2.3 million cubic yards placed, the dam was 37 percent complete. By the end of April, 3.2 million cubic yards were in place and the Mannix dam builders were well past the halfway mark.

Throughout the contract, 657 scraper units like the one at left have provided flexibility and high production — hauling up to 75% of the 22,000 cubic yards averaged each day. Top - a squatting Sasquatch (Bighorn variety) watches progress from a safe distance.



At left, zone material is spread adjacent to the north abutment of the main dam. Right, a crew keeps ahead of the rising level of earthfill to clean, scale and airblast the rock for an impervious seal.

With seven different zones required for the dam, getting the right material on schedule and into its place is imperative. Above a grader supplements 'dozer power' levelling freshly placed loads before being compacted to precise density.

Right. John Abernathy (now Project Manager) looks on as Alex Cummings (since transferred to Loram) points out dam specs to trade journalist Bob Considine in background.

Water is used to compact the impervious core called zone 1. Formation of frost prohibits placement of this material during the winter months. Work was concentrated on the upstream and downstream sections (zones 3 and 4) where pervious material and overburden are used. When placing was not feasible, some 200,000 cubic yards of gravel were hauled and stored for use when high water levels prevent hauling gravel from the riverbed.

Almost a quarter of a million cubic yards of heavy rock rip-rap will protect the upstream side of the dam from reservoir water action. This will be obtained from one quarry, where preparation began in February.

At this point mention should be made of the power facilities that will serve the two-fold purpose of electric generation and the control of water for alleviation of downstream pollution in the North Saskatchewan. Calgary Power's Bighorn Power Plant will be the company's thirteenth hydro-electric station, bringing its total installed hydro capacity to 788,000 kilowatts. Construction of the powerhouse and erection of two 54,000 kw. turbine generators is matching progress of the dam, in preparation for start-up before the end of this year.

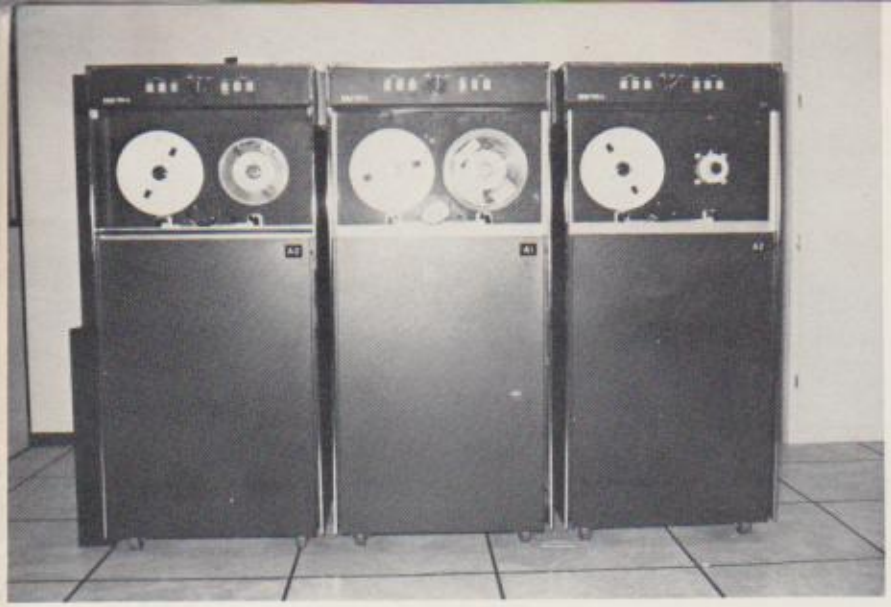
Although construction on the dam will not be finished until November 15, a temporary closure of the intake above the dam in August will stop the flow of the North Saskatchewan river. Build up of storage in the reservoir will begin. Ultimately stretching upstream for 20 miles, the largest man-made lake in Alberta will provide over one million acre-feet of storage at full supply level.

During the 80-day closure of the dam, construction crews will convert the 22-foot diameter diversion tunnel to a power conduit which will carry the water from the reservoir to the powerhouse, located below the east wing of the dam structure.

Working against a scenic backdrop, scraper makes its delivery above, returning to nearby borrow areas downstream along one of the well-kept haul roads below.

At right, overall view from south abutment shows intake structure (top left of photo). Earthmoving and compacting equipment work adjacent to the impervious core that traverses the length of the dam.

Information Uni



Efficient organization of taped computer information contributes to the smooth operation of the Data Centre. The miles of tape contained on reels in the centre's tape library are essential — so invaluable that duplicate records are maintained as insurance at a separate location.

Top left and centre: Usually seen unattended, with tape reels spinning several jobs simultaneously through the computer; centre photo of tape drives shows Joe Feller changing a tape.

Bottom left: With panels closed, business end of the computer is an unimpressive box. Honeywell serviceman reveals some of the circuitry inside that controls the memory storage, disc and tape units, printer, reader and other computer functions.

On the opposite page, part of the disc and tape drive units can be seen at left. Adjacent to the printer, operator Bob Breuer is at the console that provides direction for the entire system.

mited, Or . . . Thanks for the Memory

This is the second time the type for this publication has been set by computer. Like any specific operation newly entrusted to a machine, there were a few initial problems. Since the appearance of the first practical electronic calculator only 25 years ago however, computer technology has dealt with tens of thousands of problems that make computer typesetting difficulties seem very minor indeed.

For many years the Mannix organization has taken advantage of the business techniques made possible by the "computer revolution". More than 10 years ago, when the Canadian computer industry was still a youngster, the company began to explore its possibilities. By 1963, our own data processing staff was established, using outside computer services for estimating and project accounting. The Mannix Data Centre has been an important part of our construction team ever since.

With expanding experience in using high speed input of information and output of answers, we obtained a Honeywell 120 computer in 1968 to handle increasing volumes of in-house data processing. It wasn't long before another need became obvious — faster communication between project and office, and quicker response time between input and output of reports. By November of last year conversion had been made to a Honeywell 1015 computer.

The new computer upgrades the operation in terms of speed and memory capacity. At the same time it has the capacity for 32 remote terminals, providing the ability to receive data directly from field locations or associated company offices over telephone lines. Output information is returned directly to the remote location by the computer.

One example is an overburden removal contract, where a big investment in equipment makes up-to-date cost control imperative. Equipment repair time, repair parts issued, and operating hours for a given period are sent directly to the computer via terminal. If there are errors, the computer returns them for correction by project personnel and notifies the computer operator when the information is in order.

Peter Mittertreiner, Data Centre Co-ordinator, is responsible for all computer operations.

E. J. Volk, Manager of the Mannix Data Centre.

Bob Thompson, Operations Supervisor, monitoring communications lines.

Then the computer goes to work, utilizing 19 programs to add period costs and to-date costs and print the output. Within 30 minutes, it has printed a detailed equipment cost report, a summary of costs for similar equipment, and control reports. These are printed simultaneously in the field office and the division office in the Mannix building. It is just one of 275 regular reporting jobs performed in the Data Centre each month.

Today the Data Centre provides processing services for Mannix Co., Alberta Concrete, Manalta Coal, Mon-Max Services, Pembina Pipe Line, Techman, and Loram. In general, jobs include engineering work, project estimating, field accounting, head office accounting, equipment reports and critical path planning. In one instance, input of daily sales information is stored; each day up to 1,000 invoices and reports are printed, and at month-end the computer produces up-to-date statements and prints them ready for mailing.

The central processing unit provides arithmetic functions at a fantastic pace, houses the programs and stores the material that the programs act upon. It is exceedingly complex but it cannot think. Everything depends on what is put into it and the program systems and programs that instruct it what to do. It needs people — highly qualified ones at that.

Changing a computer model is not like changing an automobile. Full scale operation of the 1015 represented about two years of planning and preparation. Programs had to be converted from the previous system and new programs written for terminal usage. Over 400 programs are presently in active use and each program requires the writing of 1,000 to 5,000 separate instructions. In contrast to these man-hour consuming preliminaries the machine can perform 50,000 instructions per second.

The 17 people who make up the total staff of the Mannix Data Centre provide actual computer operation, quality and accuracy

Senior Programmer, Scott Pinder tests out a new computer terminal destined for Alberta Concrete Products in Edmonton.

Bob Grainger, oversees quality and accuracy, forms, computer time records and tape library.

Al Wemp, Programming Supervisor, checks a program.

Printed computer output being checked by Doug Salt, Senior programmer.

Senior Computer Operator Guy Fairell operates communications link.

Keypunch Operators (l. to r.) Cheryl Hyland, Marie Dumonceau and Carol Bosch.

Bev Johnson, Data Centre Receptionist.

control, keypunch operation, systems design and analysis, program design, programming and other functions essential to two main objectives. These are first, to handle paper work faster, more economically and second, to provide accurate information on which management decisions can be made. It is a tool of administration and as such depends on the skills of the people who direct its abilities.

The man who guided the Data Centre through its recent development and the intricacies of changing equipment is Ed Volk, Data Centre Manager. Assisting him is Peter Mittertreiner, responsible for co-ordination between companies and departments, supervision of computer operations, systems analysis and forms design. Operations supervisor, Bob Thompson directs the day-to-day operations of computer and keypunch operators and systems scheduling. As Programming Supervisor, Al Wemp directs the activities of five programmers, systems design and program design.

It has been said that if airplane technology had developed at the same rate of speed as the computer, we would have gone from Kitty Hawk to jets in eight years. One reason for the rapid development, according to writer Aurin Uris, is that "each area of application is a front on which further advances are made . . . development and changes are only beginning."

The Mannix Data Centre is keeping pace with these developments to the mutual benefits of our clients and our group of companies. New equipment, 200 new programs in two years, an average 100 jobs per day, 650,000 pages of printed information a year — it's a pretty good beginning.

Interesting Statistics About the Computer

Tape Library

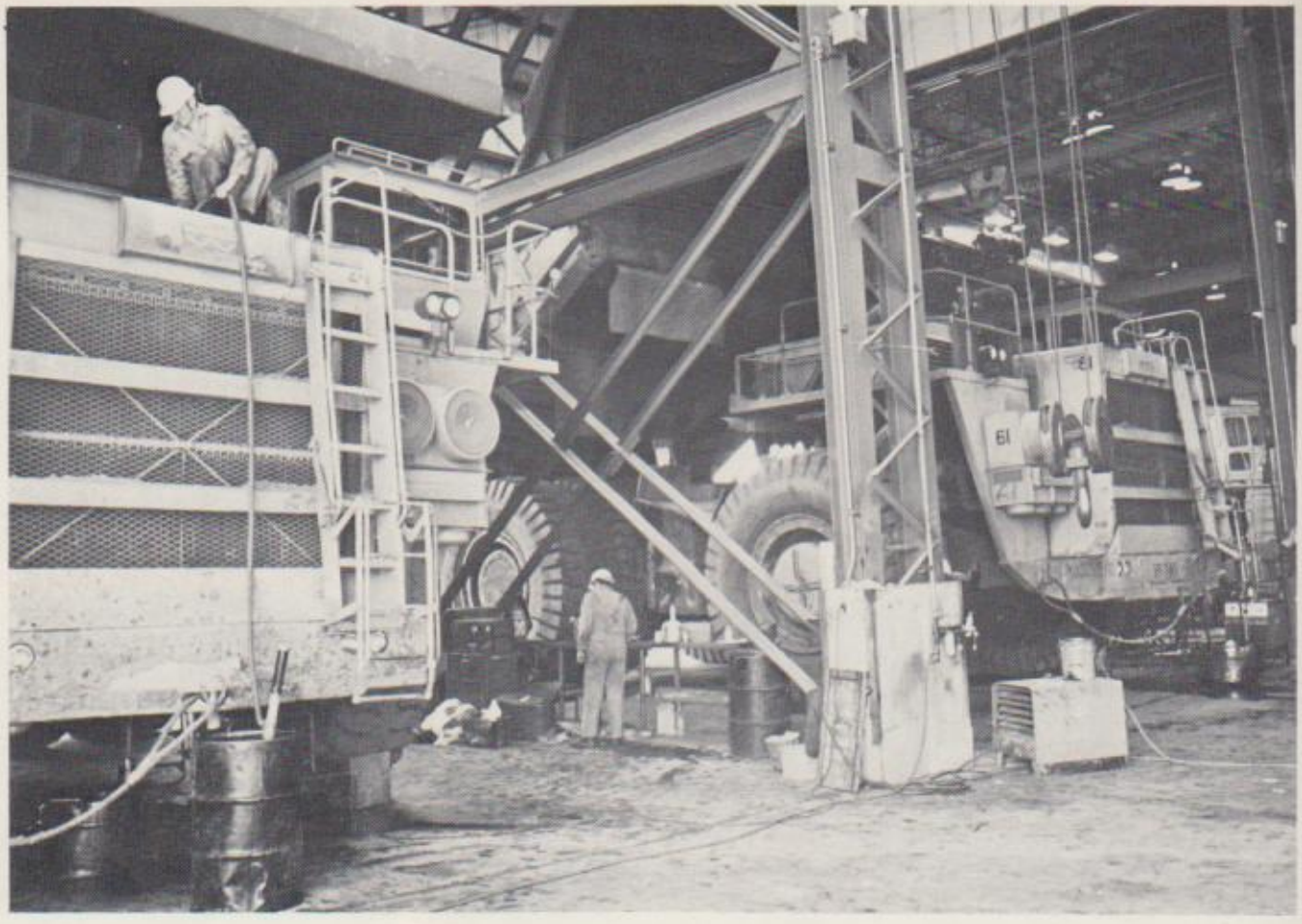
- 600 Reels of tape, containing 160 miles of tape, equivalent to a pile of computer cards 10 miles high.

Disc Library

- Disc Pack memory - 360 million characters. Sufficient to store the name, address and telephone number of every telephone subscriber in Canada.
- Prints 650,000 pages per year.

Computer

- Contains 37 miles of wire, 50,000 components
- Performs 50,000 instructions per second
- Reads 800 cards per minute
- Prints 650 lines per minute
- Aggregate throughput rate of 500,000 characters per second.

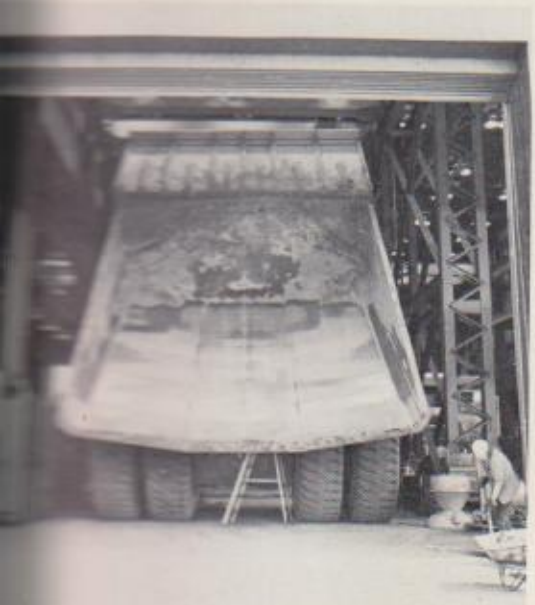


Helping to Tame the Tar Sands

(l. to r.) Stan Nordlund, Albert Werner, Louis Nedljkvon, Bill Mayotte, George Tocev, Garry Dirk, John Raddy, Harry Schultz and Alec Wanchuk.

Above, welders Daniel Cloutier, Robert Greenwall, George Zoutsos and Merv Strong; electricians Athan Varogos and Stan Lee.

Opposite page and below, G.C.O.S. service shop is huge to accommodate trucks that make workmen seem tiny.



Workhorse for moving overburden is this member of the fleet of 150 ton end dumps. With a gross weight of over 500,000 pounds and overall length of 37½ feet, it can turn a circle in 80 feet.

Kenneth F. Heddon, President of Great Canadian Oil Sands Limited, stated recently that the first quarter of 1972 was the best ever experienced, with production averaging over 48,000 barrels of synthetic crude oil per day. The Mannix General Contracts Division has taken part in these operations by removing overburden from the tar sands.

G.C.O.S. pioneered commercial open pit mining of the Athabasca tar sands. The development had its beginning in a virtually unknown field. The Company's engineering studies, planning, vast investment and development process has been a continuing one. Mr. Heddon credits the successes of 1971 largely to decisions made two or three years previously, when his company mustered every available technical and engineering resource to solve the difficulties faced.

Last year the G.C.O.S. Process Area produced over 15 million barrels of synthetic crude. "Today's key to high production is a smoothly functioning, highly productive mining operation and extraction plant", says Mr. Heddon. "We have sought to accomplish this objective by increasing supplementary mining capability."

The first step in the process of extracting the oil is the removal of the overburden, for which Mannix

(L. to r.) Servicemen Lance Taylor, Dough Simonan, Tom Oblinger, Leon Matchee, William Sanders and Ron Steinhoff.

Above, Charlie Thalheimer, Equipment Clerk, Daryl Sielsky, Assistant Master Mechanics Brian O'Neill and Gary Dirk; Shop Administrator Bob Ross and Greg Sambrook.

. . . overburden on the move - large equipment, skilled servicing

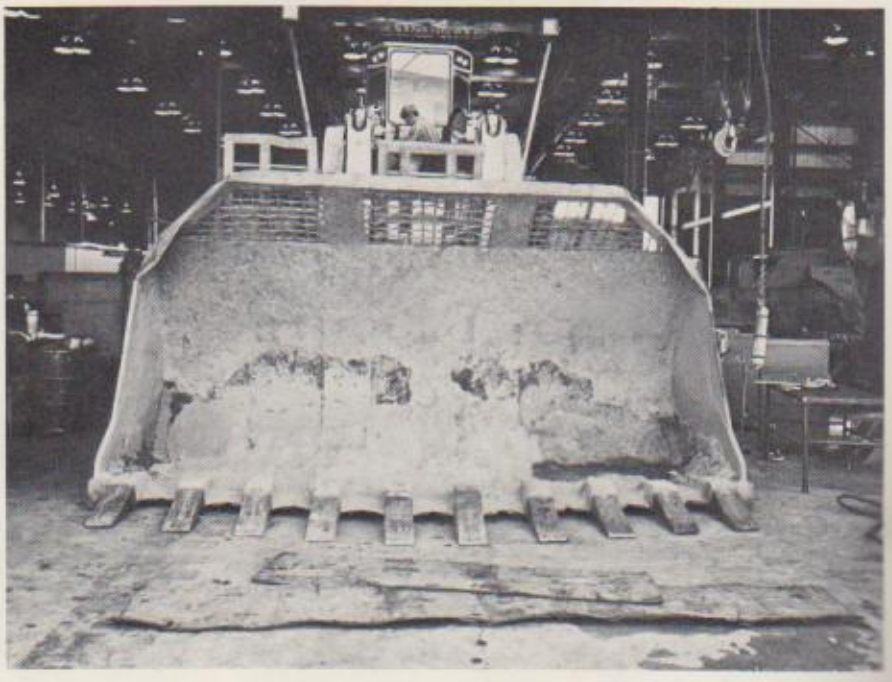
Below, activity like this is usual at Fort McMurray site as machines and skilled operators expose the tar sand. As trucks are loaded, overburden is transported to dyke construction areas.

A day shift - Bill Reid, Don Warren and John Guillet.

has been responsible since mine and extraction plant began operation in September of 1967. To handle the 38 million cubic yards of overburden that have been removed to date has required many changes and improvements in equipment since the operation began.

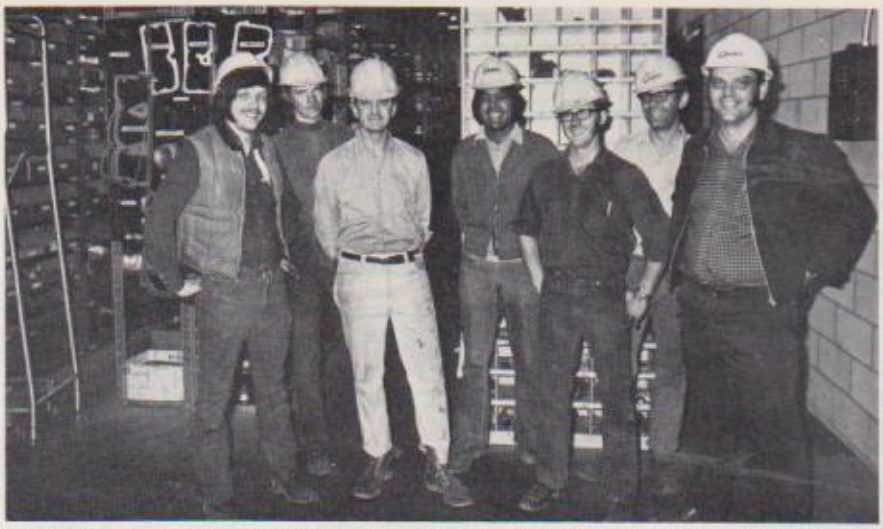
Today's earth moving fleet is supplemented by the loading capacity of a small bucket wheel excavator. According to Mannix Project Manager Henning Jensen, close to 80,000 cubic yards of overburden are being moved every 24 hours.

Working two 10-hour shifts, day and night, Mannix men operate, service and maintain, and repair all equipment for the overburden removal contract. In addition to its staff working in the large G.C.O.S. equipment service shop, Mannix Co. operates its own warehouse for ordering, issuing and receiving all equipment and parts required for servicing the G.C.O.S. earth-moving equipment.



Behind its spacious 15 cubic yard bucket a Le Tourneau loader is thoroughly checked over in the shop before returning to the field after undergoing a scheduled overhaul.

On a night shift - Palmer Keyworth, Vern Tarnowski and Gary Waniandy.



(L. to r.) Bob Powell, Jan Christensen, Harold Ledrew, Ken Ramdhanie, Terry Simonet, Jerry Bailey and Bob Marple, Warehouse Manager.

Earl Kronlund, delivery man.

In front of the Mannix office - Dave Parry, Garry Brown, Henning Jensen, Phyllis Gillis, Clarence Mattice, Margaret Church and Bill Lee.

"The full scope of our job is not always realized", says Henning Jensen. "It includes not only the removal of vast quantities of overburden, but its hauling and placement for the extensive dykes that must be built to contain the waste products and sand tailings from the extraction plant." One such dyke contains over 28 million cubic yards of material, including an impervious clay core — more than double the volume of material used in dams, power canal and dykes for Alberta's largest hydro development on the Brazeau River.

Overburden removal and disposal is of course only a large scale preliminary to the overall Great Canadian Oil Sands operation. The company recently purchased and put into operation a third bucketwheel excavator to increase delivery of tar sand to the extraction plant. After overburden removal, these machines excavate millions of tons of the oil-bearing sands annually. Once the material has been conveyed to the plant, a complex system takes over to heat it, extract the bitumen, remove the sulphur, hydrogenate it and upgrade the oil before it enters the pipeline for final delivery.

In December, 1971, G.C.O.S. passed a new milestone as it mined its one hundred millionth ton of tar sand. Nearly 200 years ago Fort McMurray bitumen was waterproofing Indian canoes. Less than 60 years ago it was tried as a paving surface. In recent days, tests of synthetic crude from the G.C.O.S. plant show encouraging results for potential use as a fuel for Canada's diesel locomotives. Diminishing North American oil reserves lend further importance to synthetic crude oil production.

For decades, men sought to tame the vast reserves of the Athabasca tar sands, until the faith and perseverance of G.C.O.S. people and their predecessors brought new meaning to Alberta's economy. For Mannix Co. and our people on this project, it is a valued and rewarding association.

Manpower-sponsored Course Aids Railroaders

Fred Nowicki (Canada Manpower), instructor Ron Hartt, Gary Scoville, Al Shaub, Don Stratton, Keith Edwards, Vern Sinclair, Allan and Dennic Scoville. Background, Tom Ewing with Dale Hewison who produced the highest marks.

Readying themselves for a Railroad Division contract in Ontario, eight Mannix employees attended a four-day course, recently held in a trailer at the Calgary Shop. Assistance with cost and sponsorship was provided by Canada Manpower under the Training-in-Industry program.

The operating and maintenance course was conducted by Ron Hartt, Service representative of Canron Ltd., Railroad Division. Particular attention was given to operating and servicing the Electromatic Tamper and Autojack Liner, with time divided equally between theoretical and practical instruction. A concluding examination was passed by all those attending.

The students were presented with a Tamper Training Course certificate of proficiency by Mr. Hartt on behalf of Tamper Inc. He commented on the cooperation of the Mannix Co. and the enthusiastic participation of the men who took the course.

Remember When?

Long time Mannix employee Alf Wright remembers one of North America's largest earth moving projects of its day — the Spray Lakes Power Development is still a major source of electrical power in Alberta. It was in 1942 that Alf first surveyed the area by packhorse and he was there when the job began in 1949 and recalls:

"Mannix built the main Spray Lakes River Dam which at that time was one of the highest earthfill dams ever built in North America. We also built the Three Sisters dam, Goat Creek dam and Side Hill Canal as part of the project. We worked real hard six days a week sometimes two shifts a day. In the winter we mostly worked clearing and sometimes it got real cold even 45 degrees below zero. We lived in wall tents which is a kind of a wooden platform with canvas walls . . . but we were alright and didn't freeze, in fact we were warm enough but the wind howled around all the time."

Overall view of the Spray Lakes Development with the Rundle Range in the distance and flanked by the Three Sisters Range. (1) Whiteman's Pass, (2) Side Hill Canal, (3) Goat Creek Dyke, (4) Original Mannix Campsite, (5) Tailrace Tunnel, (6) Powerhouse, (7) Three Sisters Dam and (8) Spray Lakes Reservoir.

Association Treasurer Bill Robinson, President Lou Pozzi and Secretary Norma Anderson.

Use It - Its Yours

The value of a group like the Mannix Employees' association is not always realized. Lou Pozzi (1972-73 president), mindful that Mannix employees have given each other the best in social and other benefits at a nominal cost for many years, outlines MEA purpose and philosophy, as he sees them.

"The Mannix Employees Association is an autonomous body representing personnel of various Calgary head offices of our group of companies. Objective is to provide services and benefits for all its membership. These include operation and staffing of two lunchrooms, farewell gifts, wedding gifts, social and sports functions, a Christmas party for our children, and remembrances to those who are hospitalized or bereaved.

"Operating monies are provided by monthly member contributions of 50 cents, an equal amount provided by each company, and profits from lunchroom operations and the various functions. Thanks to Manalta Holdings, lunchroom space is provided along with utilities.

"Keeping expense in line with revenue is always a challenge. It includes payment for lunchroom staff, all related equipment and furniture (Association owned), food and entertainment along with maintaining the benefits related previously.

"The Association is for the benefit of all members and is as strong as the support they give. Each company has representatives on the elected operations committee. Through them, your co-operation, support and suggestions contribute to the continued success of your Employees Association."

Appointments, Promotions and Transfers

Head Office

THOMAS SMITH, to Engineer, Loram Holdings, from Junior Estimator, Grading Services, Mannix, March 1.

JIM EDDLESTON, to Operations Engineer, Loram Holdings, from Senior Estimator, Engineering, Mannix, March 13.

BRENDA CURRAN, to Typist/Receptionist, Purchasing, from Microfilm Clerk, Office Services, Mannix, March 27.

HUGH ARMSTRONG, to Assistant Division Manager, Heavy Construction, from Senior Estimator, Mannix, March 22.

JOE FELLER, to Computer Operator Trainee, Data Centre, from Printer's Helper, Office Services, Mannix, April 16.

DALE FRAZER, to Administrative Assistant, General Contracts Division, from Assistant Controller, Manalta Coal, June 10.

JOE HAM, to Cost Engineer, Head Office, from Administrative Assistant, General Contracts Division, June 12.

GUY FAIRELL, to Senior Computer Operator, from Junior Computer Operator, Data Centre, July 1.

Fort McMurray

BARRY BROWN, to Accounts Payable Clerk, Fort McMurray, from Payroll Clerk, B.C. Pipeline project, February 7.

VERN SANDAU, Project Accountant, from Wabush, Labrador, June 1.

ARCHIE LILLICA, to Grade Foreman from Superintendent, Churchill Falls, June 19.

Wabush, Labrador

CELINE LACOSTE, to Payroll Clerk from Office Clerk, February 28.

JOHN MORRISSEY, to Assistant Warehouse Manager from Warehouseman, April 1.

GEORGE ST. GELAIS, to General Foreman from Driller Foreman, April 3.

MATT VAN GORP, to Field Engineer from Cost/Schedule Engineer, June 1.

PETER SCOTT, to Cost/Schedule Engineer from Field Engineer, Grande Cache, June 9.

Grande Cache

KEN LONG, to Superintendent, Grande Cache, from Estimator, Engineering, Head Office, April 27.

EUGENE PURCHA, to Instrumentman from Rodman, May 1.

WALLY WASSON, to Project Engineer from Engineer, Manalta Coal, June 1.

RONALD STRICKLAND, to Equipment Superintendent from Master Mechanic, Welland Canal, July 1.

Welland Canal

AARON LITCHINSKY, to Field Office Manager, Welland, from Field Office Manager, Mon-Max, May 1.

LANCE REID, to Project Engineer from Intermediate Estimator, Head Office, May 1.

WARREN VAILE, to Engineering Clerk from Head Office, May 12.

TOM WOZNY, to Project Manager from Australia Railroad project, June 1.

Boston Bar

CHARLIE ALLAN, Project Superintendent, Boston Bar Rock Bolting, from Senior Shift Superintendent, Grande Cache, April 9.

MARTIN FELLER, to Project Office Manager, Boston Bar, from Paymaster, Bighorn, April 20.

Mx Newcomers

BARNEY O'NEILL, Pipeline Superintendent, Pipeline Division, Head Office, March 15.

LARRY POWERS, Engineering Trainee, Engineering, Head Office April 24.

GILBERT VANDENBOSCH, Crusher Foreman, Wabush, Labrador, April 25.

PETER BALOGH, Paymaster, Bighorn, May 1.

GREG GIBSON, Junior Programmer, Data Centre, May 1.

RONALD STRICKLAND, Master Mechanic, Welland Canal, May 1.

MOWAT GOOD, Senior Estimator, Engineering, Head Office, May 2.

STEPHEN WILSON, Printer's Helper, Office Services, Head Office, May 3.

RICHARD HIRE, General Foreman, Welland Canal, May 8.

JOHN ROCHA, General Foreman, Welland Canal, May 8.

WARREN VAILE, Engineering Clerk, Welland Canal, May 8.

WESLEY TOWERS, Rodman, Welland Canal, May 10.

WALTER WAGNER, Master Mechanic, Fort McMurray, May 10.

PATRICIA McGREGOR, Accounts Payable Clerk, Wabush, May 15.

WILLIAM GARDNER, Warehouse Manager, Welland Canal, May 16.

RICHARD CLENDENING, Chainman, Welland Canal, May 17.

HARRIETT KAZIMER, Payroll Clerk, Welland Canal, May 18.

HUGH BARE, Track Superintendent, Welland Canal, May 23.

DAVID CHRISTENSEN, Field Engineer, Welland Canal, May 23.

CHERYL HYLAND, Key Punch Operator, Data Centre, May 23.

ROCH BOUCHARD, Master Electrician, Wabush, Labrador, May 24.

RICHARD INTERISANO, Rodman, Welland Canal, May 29.

BRUCE RUCH, Accounts Payable Clerk, Welland Canal, May 25.

EVERT KUIPER, Security Officer, Welland Canal, May 29.

JAMES MARTIN, First Aid Attendant, Welland Canal, May 29.

DOUGLAS QUANTZ, Assistant Foreman, Welland Canal, May 29.

HERBERT DONALDSON, Manager, Special Projects and Development, Vancouver, June 1.

The Mannix Directory

Mannix Co. Ltd.

		Phone	Area Code
Head Office: 815 - 2nd Street S.W., Calgary, Alberta, Box 2550	**Private Branch Exchange**	**267-5111**	**403**
G. J. Pollock, President	3626 - 13th Street S.W., Calgary	243-0872	403
C. L. Robertson, Executive Vice-President	13031 Canso Place R.R. 3, Calgary	252-5903	403
F. O'Sullivan, Vice-President	13838 Ravine Drive, Edmonton	452-4648	403
P. J. Quinton, Manager, Heavy Construction Division	6802 Lowell Crescent, Calgary	242-0776	403
K. F. Randall, Manager, General Contracts Division	2908 University Place, Calgary	282-3790	403
W. N. Taylor, Manager, Mine Services	1223 Lansdowne Avenue, Calgary	243-1427	403
A. R. Glennie, Manager, Railroad Services	3419 Cascade Road N.W., Calgary	284-2630	403
R. F. C. Marriott, Manager, Pipeline Division	1327 - 75th Avenue S.W., Calgary	252-4050	403
C. Thalheimer, Manager, Equipment Division	10523 Bradberry Drive S.W., Calgary	252-0327	403
H. N. Yeomans, Chief Engineer	2008 Glasgow Drive S.W., Calgary	249-5925	403
R. W. Eden, Secretary and General Counsel	523 Riverdale Avenue S.W., Calgary	243-0954	403
P. S. Christensen, Controller	6 Stanley Place S.W., Calgary 6	243-1391	403
J. T. Wood, Treasurer	1308 Killearn Ave. S.W., Calgary 9	253-2417	403
Mr. L. A. Morrison, Assistant Treasurer	49 Gateway Drive S.W.	242-4485	403
E. A. Perry, Personnel Manager	1120 Lake Sundance Crescent S.E., Calgary	271-3034	403
W. C. Couch, Chief Purchasing Agent	3320 Morley Crescent N.W., Calgary	282-2417	403
Shops and Warehouse: 3201 Ogden Road, Calgary, Alberta		**267-5457**	**403**
After hours		249-9822 or 266-6643	403
Aviation Facilities: Calgary International Airport, Calgary, Alberta		**277-0717**	**403**
Edmonton Office: 604 Revillon Building, Edmonton, Alberta		**424-8276**	**403**
Vancouver Office: 521 West 8th Avenue, Vancouver, B.C.		**872-8171**	**604**

Associated Companies

Manalta Coal Ltd.

Head Office: 300 - 9th Avenue S.W., Calgary, Alberta, Box 2880		**267-5311**	**403**
J. H. Irving, President	636 Wilderness Drive S.E., Calgary	271-6941	403
G. F. Coates, Vice-President and General Manager	20 Walnut Drive S.W., Calgary	249-5837	403
R. Goodman, Vice-President	3412 - 8A Street S.W., Calgary	243-7819	403
M. A. Summersgill, Manager of Operations	3720 Logan Crescent S.W., Calgary	249-1782	403
G. Strmotich, Chief Engineer	1428 - 22nd Street N.W., Calgary	282-7476	403
J. Warren, Controller	1215 Mapleglade Drive S.E., Calgary	271-3791	403
S. McKinnon, Secretary and General Counsel	88 Gloucester Crescent S.W., Calgary	249-8407	403
J. T. Wood, Treasurer	3803 - 9th Street S.W., Calgary	243-3035	403
J. R. Hardie, General Sales Manager	5124 Valance Crescent N.W., Calgary	288-6035	403
Highvale Mine Office: P.O. Box 30, Seba Beach, Alberta		**797-3827**	**403**
Klimax Mine Office: Estevan, Saskatchewan		**634-4233**	**306**
Roselyn Mine Office: Sheerness, Alberta		**854-2385**	**403**
Vancouver Office and Coal Yard: 345 Industrial Avenue		**685-5435**	**604**
Vesta Mine Office: Halkirk, Alberta		**884-2234**	**403**
Whitewood Mine Office: Wabamun, Alberta		**646-2215**	**403**

Utility Coals Ltd.

300 - 9th Avenue S.W., P.O. Box 2880, Calgary, Alberta	**267-5311**	**403**
Utility Mine Office: Estevan, Saskatchewan	634-3433	306

Great West Sales/Great West Coal Sales

Winnipeg, Manitoba	942-8557	204
Brandon, Manitoba	727-0614	204
Estevan, Saskatchewan	634-4371	306
Saskatoon, Saskatchewan	374-5678	306
Calgary, Alberta	267-5366	403
Vancouver, B.C.	681-1454	604

Master Explorations Ltd.

300 - 9th Avenue S.W., P.O. Box 2880, Calgary, Alberta — **267-5311** **403**

E. J. Panchysyn, President	3835 - 11th Street S.W., Calgary	243-0692	403
R. R. Vennard, Superintendent of Operations	1314 Windsor Street N.W., Calgary	282-7942	403

Alberta Concrete Products Co. Ltd.

P.O. Box 159, 8635 Stadium Road, Edmonton, Alberta — **424-7211** **403**

R. C. Hermann, President			
O. T. Richardson, Executive Vice-President	6804 - 108th Avenue, Edmonton	469-4822	403
E. R. Christiansen, General Manager	9640 - 74th Street, Edmonton	469-4298	403
J. T. Wood, Treasurer	3803 - 9th Street S.W., Calgary	243-3035	403
G. M. Kenyon, Chief Engineer	8111 - 132A Avenue, Edmonton	476-0896	403
L. H. Dennis, General Sales Manager	13632 - 122nd Avenue, Edmonton	455-5042	403
A. L. Pringle, Manager of Operations	10940 - 70th Avenue, Edmonton	434-1333	403
L. Gordon, Controller	31 Circlewood Drive, Sherwood Park		
W. E. Finlay, General Superintendent, Special Projects	P.O. Box 384, Sherwood Park	699-9289	403
O. Wolff, Shop Superintendent	9612 - 81st Street, Edmonton	466-7764	403
R. Tischer, Wabamun Superintendent	7562 - 110th Avenue, Edmonton	477-1550	403
W. Fulks, General Superintendent of Contracts	16504 - 83rd Avenue, Edmonton	489-0996	403
A. D. Knoll, Concrete Superintendent	5207 - 95th Avenue, Edmonton	466-3304	403
R. Richardson, Supt. Aggregate Production	10419 - 69 Street, Edmonton	466-3249	403

Empire Development Company Limited

300 - 9th Avenue S.W., P.O. Box 2550, Calgary, Alberta

J. L. E. Price & Company Limited

5311 Maisonneuve Blvd. West, Montreal, P.Q. — **488-9511** **514**

G. A. Ekers, President	431 Mount Pleasant Avenue, Westmount, P.Q.	935-6300	514
J. T. Wood, Treasurer	Country House	226-2803	514
	3803 - 9th Street S.W., Calgary, Alberta	243-3035	403

Loram Holdings Ltd.

300 - 9th Avenue S.W., P.O. Box 2550, Calgary, Alberta — **267-5333** **403**

*Directors			
*E. W. Costello, Chairman of the Board	1114 Frontenac Avenue S.W., Calgary	244-5077	403
*Fred P. Mannix, President	Box 38, R.R. 3, Calgary	281-6218	403
*R. Mannix	R.R. 3, Calgary	255-0652	403
*B. L. Montgomery, Vice-President	230 - 40th Avenue S.W., Calgary	243-6840	403
G. J. Pollock, Vice President	3626 - 13th Street S.W., Calgary	243-0872	403
*A. F. Mayne, Director	Place Ville Marie, Montreal, P.Q.	874-8785	514
A. Cummings, Vice-President and General Manager	2240 - 98th Avenue S.W., Calgary	281-5425	403
J. A. McDonald, Vice-President of Operations	915 - 70th Avenue S.W., Calgary	253-1759	403
J. A. Eddleston, Manager of Operations—Construction	3136 Conrad Drive, Calgary	289-8752	403
J. T. Wood, Treasurer	3803 - 9th Street S.W., Calgary	243-3035	403
W. G. Gray, Controller	1413 Premier Way S.W., Calgary	244-5090	403
W. H. H. Tidswell, Secretary and General Counsel	1310 Montreal Avenue S.W., Calgary	245-4661	403
R. M. P. Mears, Executive Assistant to the President	1332 Frontenac Avenue S.W., Calgary	245-2539	403
R. A. Jamieson, Tax Supervisor	2827 - 25A Street S.W., Calgary	242-4050	403

Manalta Holdings Ltd.

301 - 8th Avenue S.W., P.O. Box 2550, Calgary, Alberta — **267-5320** **403**

F. L. Fenwick, President	13 - 37th Street S.W., Calgary	242-1900	403

Manark Holdings Ltd.

521 West 8th Avenue, Vancouver, B.C. — **872-8171** **604**

V. Fabri, President	1055 West 46th Avenue, Vancouver	261-6004	604
F. Sheffer, Assistant Manager	2983 Pinnacle Street, Port Coquitlam, B.C.	942-6173	604

Mannix International Incorporated

1125A Nathan Lane North, Minneapolis, Minnesota 55441		**545-0411**	**612**
R. A. Peppin, President	4810 East Marie Lane, Minneapolis, Minn. 55422	588-0327	612
E. W. Miller, General Manager	Rte. 1, Box 40, Lonsdale, Minn. 55046	887-2659	507
P. J. Meade, Controller	3631 Lancaster Lane, #311, Minneapolis, Minn. 55427	546-1976	612
J. T. Wood, Treasurer	3803 - 9th Street S.W., Calgary, Alberta	243-3035	403
Canadian Office: 815 - 2nd Street S.W., Calgary, Alberta		**266-7361**	**403**

Mannix Construction Inc.
Maintenance of Way Division

1125A Nathan Lane North, Minneapolis, Minnesota 55441		**545-0411**	**612**
R. A. Peppin, Vice-President	4810 East Marie Lane, Minneapolis, Minn. 55422	588-0327	612
R. Danko, Chief Engineer	1420 Yosemite Avenue North, Minneapolis, Minn. 55442	545-7942	612
G. A. Shannon, Production Manager	7620 Riverdale Road North, Minneapolis, Minn. 55430	561-3048	612
R. C. Wahl, Operations Manager	3601 North Lancaster, Minneapolis, Minn. 55427	546-1137	612
J. E. Gavin, Marketing Manager	1775 Brentwood Lane, Wheaton, Illinois 60187	668-6195	312

Mon-Max Services Ltd.

737 - 8th Avenue S.W., Calgary, Alberta		**263-1520**	**403**
M. Roach, Vice-President and General Manager	3127 Underhill Drive, Calgary	282-3423	403
T. E. Morimoto, Vice-President—Engineering	30 Columbia Place, Calgary	289-1096	403
D. Hoeppner, Construction Manager	3351 Upton Place, Calgary	289-8166	403
D. M. Davis, Controller and Assistant Secretary	210 Westminster Drive, Calgary	242-5754	403
J. T. Wood, Treasurer	3803 - 9th Street S.W., Calgary	243-3035	403
Eastern Office: 1245 Martin Grove Road, Rexdale 603, Ontario		**743-4567**	**401**

Pembina Pipe Line Ltd.

300 - 9th Avenue S.W., Calgary, Alberta		**267-5411**	**403**
R. J. White, President	12931 Candle Cres. S.W., R.R. 3, Calgary	281-3833	403
R. N. Sanders, General Manager	2916 Lancaster Way S.W., Calgary	242-3384	403
T. Parks, Manager, Oil and Gas Department	1836 Bayshore Road S.W., Calgary	281-3524	403
G. E. Brown, Manager, Pipeline Department	2311 Pallisview Place S.W., Calgary	281-1311	403
G. E. Thompson, Controller	3240 Conrad Drive N.W., Calgary	289-9423	403
A. V. Comeau, Secretary	511 Wilderness Drive S.E., Calgary	271-6152	403
J. T. Wood, Treasurer	3803 - 9th Street S.W., Calgary	243-3035	403

Techman Ltd.

310 - 9th Avenue S.W., Calgary, Alberta		**267-5518**	**403**
A. F. Seraphim, President	4512 Britannia Drive S.W., Calgary	243-1352	403
H. Sonnenberg, General Manager	1123 Lake Sylvan Dr. S.E., Calgary	271-0252	403
J. G. Bruce, Operations Manager	5416 Lasalle Crescent S.W., Calgary	249-1041	403
W. G. Kosten, General Manager, PEMCAN Services	2812 Linden Drive S.W., Calgary	242-8126	403
L. Narraway, Chief Engineer, Pipeline Division	2 Granville Crescent, Calgary	249-6956	403
L. C. Pozzi, Assistant to the President	1428 - 9th Street N.W., Calgary	289-6296	403
R. N. Sanders, Manager, Special Projects Division	2916 Lancaster Way S.W., Calgary	242-3384	403
J. Turner-Bone, Manager, Buildings, Project & Construction Management	6707 Lepine Court S.W., Calgary	242-7958	403

Lethbridge Concrete Products Ltd.

9th Avenue and 6th Street North, Lethbridge, Alberta		**328-9251**	**403**
E. C. Oates, Vice-President and General Manager	1026 Lakeview Drive S., Lethbridge	328-7536	403
R. A. Bartlett, General Superintendent	948 13th Street S., Lethbridge	327-4869	403
P. H. E. Tompkins, Sales Manager	310 - 26th Street S., Lethbridge	328-8382	403

Projects

Mannix Co. Ltd.

Heavy Construction Division—Sponsored Contracts

Bighorn Dam—Construction of the main dam and associated earth works. Project Mgr., A. R. Cummings; Office Mgr., M. Mikuska. Telephone 781-3766. Address P.O. Box 650, Rocky Mountain House, Alberta.

Churchill Falls Dyke Surveillance—Churchill Falls Power Project. Project Mgr., J. Tonelli; Office Mgr., G. A. O'Neill. Telephone 709—925-8946.

Mount Wright Development Project—(La Cie Mannix (Quebec) Ltee & Associates) Quebec Cartier Mining Company—Earthwork, Foundations and Concrete, Mount Wright, Quebec. Project Mgr., G. W. Scraba; Office Mgr., W. Wagner. Telephone 418—287-5665. Montreal Purchasing & Expediting Office: Suite 300, 3300 Cavendish Blvd., Montreal, Quebec, E. O. Labrosse Purchasing Agent, telephone 514—482-7795.

Non-Sponsored Contracts

Little Goose Dam—Vinnell-Mannix-Fuller-Dillingham. Construction of concrete dam and navigation works on Snake River, near Dayton, Washington, for the U.S. Army Corps of Engineers. Scope includes six spillways, six-turbine powerhouse, earthfill dam and 675-foot lock. Star Route, Pomeroy, Washington. Starbuck 399-2211, Area Code 509.

John Day Powerhouse Completion—Vinnell-McNamara-Mannix-Fuller. The completion of the powerhouse portion of the John Day dam project including the installation of 16 turbines and generators, near The Dalles, on the Washington-Oregon boundary. A joint venture for the U.S. Army Corps of Engineers.

Grand Coulee Third Power Plant—Vinnell-Dravo-Lockheed-Mannix. Construction of Concrete Forebay Dam, Penstocks and Powerhouse and Appurtenant Works for United States Department of the Interior, Bureau of Reclamation. Columbia River at Grand Coulee Dam, Washington, U.S.A. Project Mgr., J. D. Heckart.

General Contracts Division

Railroad Services:

Welland Canal Track Work—Track laying and ballasting on 25 mile diversion in the Welland Canal area for Penn Central Transportation Company, and construction of minor maintenance buildings and one major bridge. Project Mgr., T. Wozny; Office Mgr., A. Litchinsky. Telephone (416) 735-4090. P.O. Box 37, Welland, Ontario.

Mine Services:

Great Canadian Oil Sands Overburden Removal—Overburden excavation and tar sand mining for Great Canadian Oil Sands Ltd. Project Mgr., H. Jensen; Office Mgr., Wm. Lee. Telephone 743-2401, Telex 037-5210. P.O. Box 750, Fort McMurray, Alta.

Rock Bolting, Fraser Canyon—Hydraulic sealing, rock bolting and shortcreting, on rock faces above C.N.R. main line in Fraser Canyon at Hells Gate for the Canadian National Railway. Project Mgr., C. W. Allen; Office Mgr., M. J. Feller. Telephone (604) 867-9628. P.O. Box 40, Boston Bar, B.C.

Grande Resource Management Ltd.—McEvoy Strip Mining—Overburden removal and coal mining for McIntyre Porcupine Mines Limited, Box 569, Grande Cache, Alberta. Telephone (403) 827-3711. Project Mgr., W. A. Dean; Office Mgr., P. Bagger.

Alberta Concrete Products Co. Ltd.

72K17	Residential Paving	City of Edmonton Contract #467
72K18	Concrete Paving	City of Edmonton Contract #468
72K19	Beverly Bridge Approaches	City of Edmonton Contract #469
72K20	Concrete Sidewalk Construction	City of Edmonton Contract #473
72K21	Paving Broadmoor Boulevard	County of Strathcona #20
72K42	Taxiway, Road and Utilities	Dept. of Transport

Mon-Max Services Ltd.

Canatom Mon-Max—Glace Bay Project, P.O. Box 98, Glace Bay, Nova Scotia. Montreal Office: 620 Dorchester Blvd. West, Montreal, Quebec. Telephone 514—878-4683.

Hudson's Bay Oil & Gas Co. Ltd.—Design and construction of gas plant and sulphur plant expansion at Lone Pine Creek, Alberta. Project Superintendent, W. Carlson. Project Engineer, W. J. Drake.

Canadian Industries Limited—Construction of Ammonium Nitrate Unit, Calgary Plant.

Techman Ltd.

TM 6-	Administration and Management	The Solids Pipeline Research & Development Association
TM13-5	PEMCAN—Corridor Study	Alberta Gas Trunk Line
TM13-12	PEMCAN—Mathematical Model	Alberta Gas Trunk Line
TM13-13	PEMCAN—Gas Arctic Pipeline Analysis	Alberta Gas Trunk Line
TM14-	Gregg River Mine	Manalta Coal Ltd.
TM18-	Wood chip pipeline	Bowaters, Newfoundland
TM20-	Construction Management	Athabasca University
TM36-	Project Co-ordination	Calgary Convention Centre

Mannix Construction Inc., Maintenance of Way Division

Southern Pacific Railroad—Ballast and tie renewal system	San Francisco
Southern Pacific Railroad—Ballast and tie renewal system	Houston, Texas
Canadian Pacific Railroad—Winch Cart rental	Alberta, Canada
Canadian National—Ballast and tie renewal	Prairie Region, Kamsack, Saskatchewan
Canadian National—Ballast and tie renewal	St. Lawrence Region, Valleyfield, Quebec
Neosho Construction Co.—Sledding new construction	Gillette, Wyoming
Missouri-Kansas-Texas Railroad—Autosled and Winch Cart—rehabilitation	Washington, Missouri
Ontario Northland Railway—Autosled and Winch Cart—rehabilitation	North Bay, Ontario
Morrison-Knudsen Co., Inc.—Autosled—ballasting on new construction	Page, Arizona
Pacific Great Eastern Railway—Sledding ballast on new construction	Quesnel, British Columbia
Pacific Great Eastern Railway—Ballast and tie renewal—rehabilitation	Fort St. James, British Columbia
Pacific Great Eastern Railway—Tie renewal	Fort St. James, British Columbia
Long Island Railroad Co.—Undercutting and tie renewal	Jamaica, New York
Norfolk and Western Railway—Shoulder Ballast Cleaner	Indiana-Illinois-Missouri-Ohio